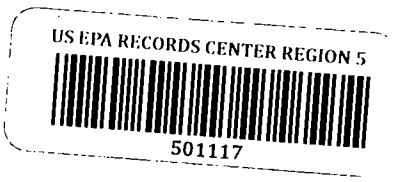
BRAUSCH ENVIRONMENTAL, LLC

(b) (6)
Gibsonia, PA 15044-9795
Office: (724) 444-0377
Cell: (b) (6)
Fax: (724) 444-0351
Email: lbrausch@fyi.net



Via Electronic and First-Class Mail

August 1, 2011

Mr. James J. Hahnenberg
Remedial Project Manager
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard, SR-6J
Chicago, IL 60604-3590

Re: Revised Remediation Goals, North Bronson Industrial Area Site
Operable Unit 1, Bronson, Michigan

Dear Mr. Hahnenberg:

This letter follows the July 7, 2011 meeting in Lansing, Michigan among representatives of the North Bronson Potentially Responsible Parties Group (the Group), the U.S. Environmental Protection Agency (USEPA), and the Michigan Department of Environmental Quality (MDEQ) in which the parties discussed the derivation and application of Remediation Goals (RGs) for Operable Unit 1 of the North Bronson Industrial Area (NBIA) Site (the Site). This letter summarizes those discussions and presents the Group's proposed RGs for each potentially affected environmental medium to be addressed under NBIA Operable Unit 1.

The objectives of Operable Unit 1 will be achieved by addressing the following potentially affected environmental media:

- Sediments in County Drain #30 (CD #30);
- Erodible Soils along both the north and south banks of CD #30;
- Non-Erodible Soils north of CD #30, which were impacted as a result of placement in this area of Sediments dredged from CD #30;
- Non-Erodible soils in the Eastern Lagoon Area (ELA) and Western Lagoon Area (WLA), but outside any designated Waste Management Area (WMA) associated with either of these areas, if applicable;

- Groundwater containing constituents of concern (COCs) that derive from dredged CD 30 Sediments placed along the north side of CD30; and

- Groundwater containing COCs that are sourced in the ELA or WLA.

Because the RGs defined in the Record of Decision (ROD)[1] are, in some instances, outdated or otherwise not appropriate, the Group and agencies agree that new RGs should be identified. The intent of these revisions is to establish cleanup goals that are protective of human health and the environment and which can be achieved and sustained in the long term through an efficient and implementable remedial design. The following paragraphs discuss the environmental media to which the RGs apply, the proposed numerical standards for those COCs identified in the ROD, and the proposed methodology to be employed to demonstrate attainment of RGs.

CD #30 SEDIMENT

For purposes of NBIA Operable Unit 1 Remedial Design and Remedial Action, "CD #30 Sediment" is defined as follows:

> Solid and semi-solid materials at the bottom of CD #30 that are submerged under normal flow conditions and which form the substrate for the benthic community in this surface water body.

Figure 1 is a typical cross-section of CD #30 showing the materials defined as Sediment. Such materials are readily distinguishable in the field, and complete removal of Sediment in any given reach of CD #30 can be verified during remedial construction by visual inspection.

The numerical values of the Sediment RGs are identified in the attached Table 1. In accordance with the ROD (see ROD Section 7.B and Table 2), these standards are based on the following:

- Sediment Quality Benchmarks (SQBs) – Ecologically risk-based guidance values designed to be protective of the aquatic ecosystem;

- Direct Contact Values (DCVs) – Human health risk-based MDEQ Part 201 Residential Generic Cleanup Criteria And Screening Levels;[2] and

---

[1] USEPA and MDEQ, 1998. *Declaration, Selected Remedial Alternative for the North Bronson Industrial Site, Operable Unit 1, City of Bronson, Branch County, Michigan.* June.

[2] MDEQ, 2004. *RRD Operational Memorandum No. 1, Part 201 Cleanup Criteria, Part 213 Risk-Based Screening Levels*, Remediation and Redevelopment Division, December 10 (Attachment 1 Table 2 Updated January 23, 2006).

- Sediment Background – Site-specific Sediment background determined in accordance with MDEQ guidance.[3]

As shown in Table 1, the SQB is the RG for each COC for which the ROD identifies an SQB. The proposed cleanup standards for these COCs are unchanged from those presented in the ROD (see ROD Table 2). The application of such SQBs is considered highly conservative as CD #30 is a man-made drainage ditch that receives treated industrial and municipal wastewater discharges and urban and agricultural storm water runoff. The quality of the ongoing point source and nonpoint source discharges and the hydraulics of this drainageway (*i.e.*, very shallow depth of flow, especially during the hot summer months) do not allow for a diverse aquatic ecosystem or a significant fishery.

Proposed changes for RGs for other COCs (*i.e.*, COCs for which the ROD does not specify a cleanup goal based on an SQB) reflect the updated DCV for arsenic provided by MDEQ and the updated Site-specific Sediment background for barium, manganese, and cadmium, as determined by the sampling conducted by the Group in 2010.[4] The Group understands that these revised numerical standards are acceptable to USEPA and MDEQ.[5]

Successful completion of Sediment remediation will be documented by determining post-remedial exposure point concentrations (EPCs) in Sediment and confirming that these EPCs are below RGs for all identified COCs. The appropriate method for determining EPCs depends on the type or basis of the corresponding RG:

- EPC = arithmetic average post-remedial concentration when comparing to RGs based on an SQB; or

- EPC = 95-percent upper confidence limit of the mean (95% UCL) post-remedial concentration when comparing to RGs based on the DCV or Site-specific Sediment background.

The use of an arithmetic average is appropriate for SQB comparisons given the natural heterogeneity in the physical nature of stream sediments and the corresponding variability in the characteristic of benthic macroinvertebrate communities. Moreover, potential higher trophic level receptors (*e.g.*, fish, insectivorous birds) have feeding ranges that encompass significant reaches of the stream and are not limited to "maximum" locations.

---

[3] MDEQ, 2002. *Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria,* Remediation and Redevelopment Division.

[4] O'Brien & Gere, Inc., 2010. *Sediment and Soil Sampling Study Report, North Bronson Industrial Area, Operable Unit 1, Bronson, Michigan.* August.

[5] See Letter from Daria W. Devantier, Michigan Department of Natural Resources and Environment, to James Hahnenberg, USEPA Region 5, February 14, 2011. *North Bronson Industrial Area Superfund Site.*

The use of the 95% UCL for DCV or Site-specific Sediment comparisons is consistent with MDEQ guidance for such comparisons.[6]

The post-remedial Sediment data set will include the results of Sediment samples collected at the limits of where Sediments are removed, samples of soil that form the bottom of the new flow channel, and pre-remedial characterization data where the Sediments represented by such samples remain in place and are not removed. Although further evaluations and consultation with the Branch County Drain Commission will be conducted during RD, the expectation at this time is that Sediments removed from CD #30 will not be replaced with soil backfill. Accordingly, the native silty sandy soils now underlying these sediments would, upon completion of remediation, become the new bottom of the flow channel and form the substrate for the benthic community.

CD #30 ERODIBLE SOILS

For purposes of NBIA Operable Unit 1 Remedial Design and Remedial Action, "CD #30 Erodible Soils" are defined as follows:

> Soil exposed to surface water runoff or stream flow conditions that have the potential to cause erosion or bank scour sufficient to yield Sediment to CD #30.

Figure 1 shows the materials defined as Erodible Soil along CD #30. As shown in this figure, these are the surficial soils along the incised northern and southern banks of CD #30.

Because Erodible Soils have the potential to, in the future, become Sediment in CD #30, the same RGs apply to Erodible Soil as to Sediment. This general rule, which was proffered by MDEQ in its February 14, 2011 letter to USEPA, cannot be applied in all cases, however, because, at the NBIA Site, Site-specific soil background concentrations for several COCs exceed the corresponding Sediment RG. In such cases, the Erodible Soil RG defaults to the Site-specific soil background value. This approach is consistent with MDEQ (2002) guidance and with the ROD, which provides "Soil-to-Surface Water" cleanup goals (see ROD Section 7.A and Table 1). The ROD-specifies background as the basis of these soil cleanup goals:

> "To protect against the runoff of contaminants into CD #30, background levels have been identified as cleanup goals for surface soils close (i.e., the 10 year flood plain) to the drain."

The background soil concentrations applied as "Soil-to-Surface Water" values in the ROD, however, do not in all cases match the Site-specific soil background values calculated and

[6] The MDEQ (2002) guidance does not specify statistical methodologies for Sediment. The use of the 95% UCL for DCV or Site-specific comparisons is drawn from the analogous specifications for soils.

presented in the Remedial Investigation (RI) Report;[7] the derivation of the "Soil-to-Surface Water" values in ROD Table 1 is not known.[8] The Proposed RGs for Erodible Soil, with the soil background values determined in the RI, are listed in the attached Table 2.

Successful completion of Erodible Soil remediation will be documented by determining post-remedial EPCs in Erodible Soil confirming that these EPCs are below RGs for all identified COCs. As in the case of Sediment, the appropriate method for determining EPCs in Erodible Soil depends on the type or basis of the corresponding RG:

- EPC = arithmetic average post-remedial concentration when comparing to RGs based on an SQB;
- EPC = 95% UCL post-remedial concentration when comparing to RGs based on the DCV; or
- EPC = maximum post-remedial soil concentration for RGs based on Site-specific soil background (*i.e.*, point-by-point comparison).

The rationale for use of the arithmetic average for SQB comparisons and the 95% UCL values for DCV comparisons is the same for Erodible Soils as it is for Sediments. The use of point-by-point comparisons for soil background values is consistent with MDEQ guidance.[9]

Considering the differences in how post-remedial EPCs are calculated, there could be instances where the risk-based RG for arsenic (DCV), lead (SQB), or total cyanide (SQB) is achieved but not every sample in the post-remedial data set is less than the Site-specific maximum. In such cases, it is not necessary for concentrations at every individual point locations to meet the Site-specific soil background because the more conservative goal will have been met.

---

[7] Warzyn, Inc., 1993. *Remedial Investigation, North Bronson Industrial Area, Bronson, Michigan.* Prepared for the Michigan Department of Natural Resources, Lansing, Michigan. Four volumes. July.

[8] Based on hydrologic analyses and as confirmed by long-term observations (Personal communications with David O'Rourke, former City Manager, City of Bronson, June 9, 2010, and with Charles Buckley, City of Bronson Wastewater Treatment Plant Operator, June 10, 2010, the 10-year flood flow of CD #30 is contained within the banks of the incised ditch, and no 10-year floodplain exists outside the channel.

[9] Background concentrations in the RI (Section 5.4.1) were determined using the results of six sample locations selected as remote from site-related activities and by applying MDEQ procedures for statistical evaluation. The guidance applied in the RI was the then-applicable Michigan Department of Natural Resources, Waste Management Division *Clean-up Verification Document*, dated November 1991. That guidance has since been superseded by MDEQ (2002) *Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria.* The statistical method applied in the RI to establish the background concentration, *i.e.*, mean plus three standard deviations, remains an acceptable approach for point-by-point comparisons under the more-recent MDEQ guidance.

The post-remedial Erodible Soil data set will include the results of soil samples collected at the lateral and vertical limits of excavation at each location from which soils are removed as well as pre-remedial characterization data where the Erodible Soil represented by such samples remain in place and are not removed.

As is the case with Sediment, the expectation at this time is that Erodible Soils removed from the banks of CD #30 will not be replaced with soil backfill and that surficial materials in the new channel side slopes will be comprised of silty sandy soils currently underlying these slopes. The Remedial Design will provide for the design of a stable channel and minimize the erosion of the side slopes and bottom of CD #30. Short-term and long-term erosion control measures will be evaluated, including erosion control matting, durable vegetation, and rock channel protection.[10] Slope stability will be evaluated, and where necessary, improvements will be made to reduce potential sloughing or sliding of side slopes.

NON-ERODIBLE SOILS

For purposes of NBIA Operable Unit 1 Remedial Design and Remedial Action, "CD #30 Non-Erodible Soils" are defined as follows:

> Soil that does not have the potential to erode or scour sufficiently to yield Sediment to CD #30 because of spatial location, depth, slope, vegetation, or other surface characteristics.

Figure 1 shows the materials defined as Non-Erodible Soil on either side of CD #30. RGs apply to non-Erodible Soils located both north of CD #30 and south of CD #30 (*i.e.*, around the WLA and ELA), but do not apply to soils and sludge within the WMAs established at the WLA and, perhaps, the ELA.

Because Non-Erodible Soils do not have the reasonable potential to become Sediment in CD #30, RGs based on SQBs do not apply. Remediation will achieve RGs based on MDEQ Part 201 residential soil DCVs or soil background for arsenic for which the Site-specific soil background (8.9 milligrams per kilogram [mg/kg]) exceeds direct-contact value (7.6 mg/kg).

The proposed Non-Erodible Soil RGs are listed in the attached Table 3. As indicated in this table and discussed in more detail below, cleanup goals related to soil-to-groundwater pathways will be addressed by directly evaluating groundwater quality at suitably positioned groundwater monitoring wells.

---

[10] Because of its very flat slope (*i.e.*, average of 0.0008 feet per foot), flow restrictions (*i.e.*, culverts), and cross-sectional geometry, the flow velocity in CD #30, even under storm conditions, is less than 2 feet per second. At this velocity, the potential for bank scour is minimal, and, except in special circumstances (*e.g.*, culvert entrances and discharges, City storm drain outfall), erosion control will primarily be effected through the use of vegetative cover.

Successful completion of remediation will require determination of post-remedial EPCs in Non-Erodible Soil and confirming that these EPCs are below RGs for all COCs based comparing RGs to the 95% UCL of post-remedial concentrations. In the case of arsenic, if the post-remedial EPC in Non-Erodible Soil calculated as the 95% UCL is below the RG based on direct contact (7.6 mg/kg), it is not necessary for the arsenic concentration at each sampling location to meet the Site-specific soil background value (8.9 mg/kg).

Remediation will also be demonstrated by attainment of Groundwater to Surface Water Interface (GSI) and Boundary Criteria in groundwater by the collection of groundwater samples near CD #30. Soil RGs are not proposed for the protection of soil-to-groundwater pathways. Based on examination of Site groundwater data and synthetic precipitation leaching procedure (SPLP) testing of soils and stabilized WLA and ELA sludge, the Group will opt to rely solely on the demonstration of attainment of groundwater cleanup goals. This approach, which is consistent with Michigan regulations and guidance, provides for protection of the pathways of primarily concern and avoids dependence on unreliable modeling and assumptions regarding the relative concentrations of metals in soils, soil leachate, and groundwater. Successful completion of soil remediation will require demonstration of attainment of GSI and Boundary Criteria for inorganics in groundwater as described below.

From a practical perspective, it is the Group's intention to remove metals-impacted Non-Erodible Soil from locations north of CD 30 where such soil has the potential to cause or significantly contribute to elevated metals concentrations in groundwater. The Remedial Design will include evaluation of the soil data developed to date to define the locations of such soil. Decisions on further soil removal, treatment, or containment to reduce potential leaching to groundwater would be made during Remedial Design.

GROUNDWATER

For groundwater, RGs are based on both human health protection (*i.e.*, drinking water quality) and protection of the surface water quality in CD #30. It is noted, however, that NBIA Operable Unit 1 groundwater protection for human health is limited to institutional controls (*i.e.*, Well Restriction Ordinance in City of Bronson and Environmental Restrictive Covenants on affected properties in Bronson Township). NBIA Operable Unit 1 groundwater remediation for GSI criteria attainment is limited to source containment at the WLA and the ELA and localized source removal for Non-Erodible Soils north of CD #30.

For NBIA Operable Unit 1, the RGs for protection of drinking water are the Boundary Criteria specified in Table 3 of the ROD; the attached Table 4 lists these criteria. No changes to these Boundary Criteria are proposed.[11] In accordance with USEPA and MDEQ guidance, such drinking water quality criteria will be applied as RGs using point-by-point comparisons.

[11] Table 3 of the ROD uses incorrect units for these boundary criteria. The units have been corrected in the attached Table 4.

Attainment of the Boundary Criteria will be documented by demonstrating that these concentrations are met at wells located outside the areas covered by the above-mentioned NBIA Operable Unit 1 institutional controls.

RGs based on GSI Criteria are those developed in the MDEQ Mixing Zone Determination (MZD) of September 16, 2008.[12] These are shown for both acute and chronic conditions in the attached Table 5. In addition to the COCs specifically addressed in MDEQ's MZD, Table 5 also lists the GSI Criteria for antimony, mercury, selenium, and vanadium, which were calculated using MDEQ procedures and assumptions. These additional COCs were identified in the ROD for GSI protection and adding these to the MDEQ MZD provides for consistency in the derivation and application of these criteria.

Attainment of GSI Criteria will be documented by determining the post-remedial concentrations of inorganic and organic COCs in the flux of groundwater discharging to CD #30 and demonstrating that these concentrations do not result in exceedances of allowable loadings under acute or chronic conditions. The procedures to be employed in this determination will follow MDEQ (2002) guidance:[13]

- Compliance will be measured through groundwater quality monitoring at a minimum of nine "GSI monitoring wells" positioned throughout the "Averaging Area;"
- The GSI monitoring wells will be located to measure the quality of groundwater venting to CD #30 from both the north and south sides of the channel;
- The Averaging Area will be that applied by MDEQ in its September 16, 2008 MZD;
- The 95% UCL concentrations of COCs in groundwater will serve as the metric for determining compliance with GSI Criteria for chronic conditions;
- Point-by-point maxima will be compared to the GSI Criteria based on acute conditions.

Details of the groundwater monitoring program will be provided in RD. Compliance with these GSI Criteria in groundwater will also be considered dispositive of soil compliance with soil-to-groundwater cleanup requirements. A summary of the methods proposed to demonstrate attainment of cleanup criteria for all media is presented in Table 6.

---

[12] Because the MZD-calculated value is below quantitation limit, the GSI criterion for silver (chronic condition) defaults to the quantitation limit of 1 µg/L, which is the lowest readily available and reliable reporting value from commercial environmental laboratories

[13] See MDEQ (2002), Statistical Guidesheet 3.

CLOSING

Via our July 7, 2011 meeting and this letter, the Group has proposed revisions to the RGs specified in the Operable Unit 1 ROD. These revisions have been made to ensure that the specified standards are practically attainable in Remedial Design and Remedial Action while assuring protectiveness of human health and the environment and consistency with regulatory guidance.

As we discussed during our July 7, 2011 meeting, once these proposed RGs are approved by USEPA, the Group will prepare a schedule of RD deliverables. The RD delivery schedule can be submitted to USEPA within 21 days of such approval.

Also by this letter, as well as the discussions at our July 7, 2011 meeting, the Group understands that the substantive issues identified in the comments received from MDEQ[14] regarding the August 2010 *Sediment and Soil Sampling Study Report* and *Groundwater Delineation Study Report* have been adequately addressed. On that basis, the Group does not plan on resubmitting those reports or issuing response-to-comment documents.

We trust that this submittal satisfies your requirements at this time and thank you for your attention to this important issue. If you have questions regarding this submittal or related project matters, please do not hesitate to contact me.

Respectfully submitted,

Leo M. Brausch
Project Coordinator

LMB:

Attachments
Tables:

Table 1	Proposed Sediment Remediation Goals
Table 2	Proposed Erodible Soil Remediation Goals
Table 3	Proposed Non-Erodible Soil Remediation Goals
Table 4	Site Boundary Criteria for Groundwater
Table 5	Site-Specific Groundwater-to-Surface Water Interface Criteria
Table 6	Post-Remedial Demonstration of Attainment of Remediation Goals

Figures:

Figure 1	Typical Cross Section

[14] See February 14, 2001 Letter from Daria W. Devantier, MDEQ, to James Hahnenberg, USEPA, plus attached internal MDEQ memorandum, dated January 13, 2011, from Charles Graff to Beth Mead-O'Brien.

cc: Beth Mead-O'Brien, MDEQ
Charles W. Graff, MDEQ

cc (via email):
NBIA Operable Unit 1 PRP Group Legal Committee
NBIA Operable Unit 1 PRP Group Technical Committee

TABLES

Table 1
Proposed Sediment Remediation Goals

Constituent of Concern	ROD-Specified RG		Proposed RG		
	Value	Basis	Site-Specific Background	Sediment Quality Benchmark	Direct Contact
Antimony	2.0	SQB	0.96	**2.0**	180
Arsenic	6.6	DCV	4.8	NS	**7.6**
Barium	10	Sed Bkgd	**60**	NS	37,000
Cadmium	5.0	SQB	0.2	**5.0**	550
Chromium (total)	80	SQB	10	**80**	NS
Copper	70	SQB	14	**70**	20,000
Lead	35	SQB	7	**35**	400
Manganese	97	Sed Bkgd	**220**	NS	25,000
Mercury	0.20	SQB	ND	**0.20**	160
Nickel	30	SQB	12	**30**	40,000
Silver	1.0	SQB	ND	**1.0**	2,500
Vanadium	5.4	Sed Bkgd	**20**	NS	750
Zinc	120	SQB	52	**120**	170,000
Cyanide (total)	0.1	SQB	ND	**0.10**	12
Total PAHs	4	SQB	--	**4**	Varies

Notes:

1. *List of COCs from ROD Table 2.*
2. *All concentrations presented in units of milligrams per kilogram (mg/kg) to two significant figures.*
3. *Controlling values are boxed, shaded, and shown in **bold-face** type.*
4. *For determination of attainment of RG:*
   Use arithmetic average of post-remedial concentrations when comparing to RGs based on an SQB.
   Use 95% UCL of post-remedial concentration when comparing to RGs based on the DCV or Site-specific Sediment background.
5. *"NS" - No standard.*
6. *"ND" - Constituent not detected in background sampling. Reporting Limits vary.*
7. *"--" - Background concentration not determined.*
8. *MDEQ revised the arsenic DCV from 6.6 mg/kg to 7.6 mg/kg subsequent to the 1998 ROD.*
9. *Total PAHs = Sum of concentrations of 16 polycyclic aromatic hydrocarbon (PAH) compounds, as specified in Persaud, et al. (1993).*
10. *Specific direct-contact values apply to individual PAHs. Value range from 2 mg/kg for benzo(a)pyrene to 2,000 mg/kg for chrysene.*

Table 2
Proposed Erodible Soil Remediation Goals

Constituent of Concern	ROD-Specified RG		Proposed RG		
	Value	Basis	Site-Specific Soil Background	Sediment Quality Benchmark	Direct Contact
Antimony	7.0	Soil Bkgd	**6.6**	2.0	180
Arsenic	6.0	Soil Bkgd	**8.9**	NS	7.6
Barium	85	Soil Bkgd	**96**	NS	37,000
Cadmium	1.2	Soil Bkgd	0.79	**5.0**	550
Chromium (hexavalent)	7.0	Soil Bkgd	ND	NS	2,500
Chromium (total)	NS	--	25	**80**	NS
Copper	32	Soil Bkgd	45	**70**	20,000
Lead	21	Soil Bkgd	**49**	35	400
Mercury	0.13	Soil Bkgd	0.14	**0.20**	160
Nickel	20	Soil Bkgd	12	**30**	40,000
Silver	1.0	Soil Bkgd	ND	**1.0**	2,500
Vanadium	41	Soil Bkgd	**41**	NS	750
Zinc	72	Soil Bkgd	82	**120**	170,000
Cyanide (total)	0.4	Soil Bkgd	**0.19**	0.10	12

Notes:

1. *List of COCs from ROD Table 1.*
2. *All concentrations presented in units of mg/kg to two significant figures.*
3. *Controlling values are boxed, shaded, and shown in **bold-face** type.*
4. *For determination of attainment of RG:*
   Use arithmetic average of post-remedial concentrations when comparing to RGs based on an SQB.
   Use 95% UCL of post-remedial concentration when comparing to RGs based on the DCV.
   Use point-by-point post-remedial concentrations when comparing to RGs based on Site-specific soil background.
5. *"NS" - No standard.*
6. *"--" - Background concentration not reported.*
7. *The controlling value for total chromium (SQB) also is the controlling cleanup goal for hexavalent*
8. *"ND" - Constituent not detected in background sampling. Reporting Limits vary.*

Table 3
Proposed Non-Erodible Soil Remediation Goals

Constituent of Concern	ROD-Specified RG		Proposed RG	
	Value	Basis	Site-Specific Soil Background	Direct Contact
Antimony	36	GSI	6.6	**180**
Arsenic	6.6	DCV	**8.9**	7.6
Barium	130	GSI	96	**37,000**
Cadmium	3.6	GSI	0.79	**550**
Chromium (hexavalent)	3.3	GSI	ND	**2,500**
Copper	4,000	GSI	45	**20,000**
Lead	1.0	GSI	49	**400**
Mercury	0.17 0.07	GSI	0.14	**160**
Nickel	88	GSI	12	**40,000**
Selenium	0.40	GSI	ND	**2,600**
Silver	0.067	GSI	ND	**2,500**
Vanadium	130	GSI	41	**750**
Zinc	190	GSI	82	**170,000**
Cyanide (total)	0.1	GSI	0.19	**12**

Notes:

1. *List of COCs from ROD Table 1.*
2. *All concentrations presented in units of mg/kg to two significant figures.*
3. *Controlling values are boxed, shaded, and shown in **bold-face** type.*
4. *For determination of attainment of RG:*
   Use 95% UCL of post-remedial concentration when comparing to RGs based on the DCV.
   Use point-by-point post-remedial concentrations when comparing to RGs based on Site-specific
5. *Groundwater results will be used to demonstrate attainment for soil-to-groundwater pathways, both with respect to Boundary Criteria and GSI Criteria.*
6. *"ND" - Constituent not detected in background sampling. Reporting Limits vary.*

Must be point by point for protection of drinking water

Table 4
Site Boundary Criteria for Groundwater

Constituent of Concern	Concentration (µg/L)
cis-1,2-dichlorotheylene	**70**
Trichloroethylene	5.0
Vinyl chloride	**2**
Cadmium	5.0
Lead	4.0
Mercury	1.0
Nickel	100
Silver	34
Zinc	2,400
Cyanide (total)	200
Nitrate + Nitrite	10,000

Notes:

1. *List of COCs from ROD Table 3.*
2. *Attainment of Boundary Criteria will be documented by demonstrating these criteria are met at wells located outside the areas covered by NBIA OU1 institutional controls.*

Table 5
Site-Specific Groundwater-to-Surface Water Interface Criteria

Constituent of Concern	Acute Conditions		Chronic Conditions	
	Concentration (µg/L)	Loading (lbs/day)	Concentration (µg/L)	Loading (lbs/day)
cis-1,2-dichlorotheylene	11,000	20	670	1.2
1,2-dichloroethylene (total)	19,000	34	1,200	2.1
Ethylbenzene	320	0.58	19	0.035
Tetrachloroethylene	No standard		73	0.13
Trichloroethylene	3,500	6.3	210	0.39
Vinyl chloride	No standard		16	0.029
Xylene	730	1.3	44	0.080
Antimony	2,300	4.2	260	0.5
Arsenic	No standard		160	0.29
Barium	No standard		1,300	2.4
Cadmium	50	0.091	10	0.018
Chromium (trivalent)	No standard		260	0.47
Chromium (hexavalent)	32	0.058	12	0.021
Copper	99	0.18	32	0.058
Lead	2,300	4.2	140	0.25
Manganese	19,200	35	10,000	18
Mercury	2.0	0.0036	0.70	0.0013
Nickel	2,300	4.2	140	0.25
Selenium	100	0.18	5.4	0.010
Silver	1.1	0.0020	0.064	0.00012
Vanadium	220	0.40	13	0.023
Zinc	1,100	2.0	600	1.1
Cyanide (free)	44	0.080	5.6	0.010

Notes:

1. *Values provided in MDEQ Memorandum of September 16, 2008, except where shown in blue. These constituents were not specifically listed in the MDEQ Memorandum; the listed values were calculated using the same assumptions and bases as identified in the MDEQ Memorandum and MDEQ guiregulations and guidance..*

Table 6
Post-Remedial Demonstration of Attainment of Remediation Goals

Medium	Basis for Remediation Goal	Demonstration of Attainment
Sediment	Sediment Quality Benchmark (SQB)	Arithmetic average of post-remedial concentrations.
	Direct Contact Value (DCV)	95% UCL of post-remedial concentrations.
	Sediment Background	95% UCL of post-remedial concentrations.
Erodible Soil	Sediment Quality Benchmark (SQB)	Arithmetic average of post-remedial concentrations.
	Direct Contact Value (DCV)	95% UCL of post-remedial concentrations.
	Soil Background	Maximum post-remedial concentrations (point-by-point). (See Note 4.)
Non-Erodible Soil	Direct Contact Value	95% UCL of post-remedial concentrations.
	Soil Background	Maximum post-remedial concentrations (point-by-point). (See Note 4.)
	Soil - Groundwater Boundary Criteria	Maximum groundwater concentrations (point-by-point) outside areas with Institutional Controls to prevent exposure.
	Soil - GSI Criteria (Chronic Condition)	95% UCL of post-remedial groundwater concentrations.
	Soil - GSI Criteria (Acute Condition)	Maximum groundwater concentrations (point-by-point).
Groundwater	Boundary Criteria	Maximum groundwater concentrations (point-by-point) outside areas with Institutional Controls to prevent exposure.
	GSI Criteria (Chronic Condition)	95% UCL of post-remedial groundwater concentrations.
	GSI Criteria (Acute Condition)	Maximum groundwater concentrations (point-by-point).

Notes:

1. *See Figure 1 for depiction of Sediment, Erodible Soil, and Non-Erodible Soil.*
2. *See Tables 1 through 5 for numerical values of Remediation Goals (RGs).*
3. *"95% UCL" is the upper 95-percent confidence limit of the mean.*
4. *GSI compliance is measured at monitoring wells for venting groundwater within the defined Averaging Area.*

FIGURE

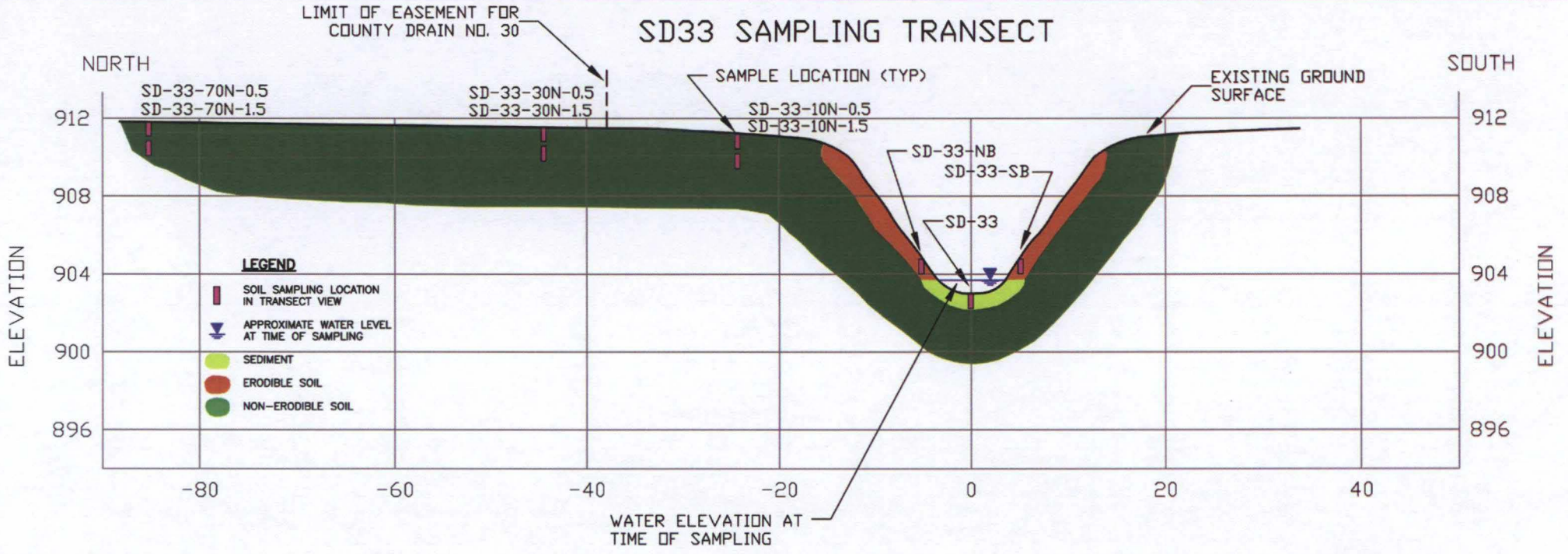


FIGURE 1
TYPICAL CROSS-SECTION
COUNTY DRAIN #30